

**What is Claimed is:**

1. A powder batch of battery particles, wherein said particles are substantially spherical and have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 20  $\mu\text{m}$ , and wherein said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.
2. A powder batch as recited in Claim 1, wherein said average particle size is from about 0.3  $\mu\text{m}$  to about 10  $\mu\text{m}$ .
3. A powder batch as recited in Claim 1, wherein said average particle size is not greater than about 5  $\mu\text{m}$ .
4. A powder batch as recited in Claim 1, wherein not greater than about 1 weight percent of said particles are in the form of hard agglomerates.
5. A powder batch as recited in Claim 1, wherein said particles comprise no more than about 0.1 atomic percent impurities.
6. A powder batch as recited in Claim 1, wherein said particles have the general formula  $\text{Li}_y\text{M}_x\text{O}_z$ , wherein Y is 0 to 2 and M is selected from Mn, Co, Ni and combinations thereof.
7. A powder batch as recited in Claim 1, wherein said particles comprise crystallites having an average crystallite size of at least about 20 nanometers.
8. A powder batch as recited in Claim 1, wherein said particles are substantially spherical.
9. A powder batch as recited in Claim 1, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

10. A powder batch of fine battery particles having the general formula  $\text{Li}_y\text{M}_x\text{O}_z$ , wherein said particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$  and wherein at least about 80 weight percent of said particles are not larger than twice said average particle size

11. A powder batch as recited in Claim 10, wherein said average particle size is from about 1  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

12. A powder batch as recited in Claim 10, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

13. A powder batch as recited in Claim 10, wherein said particles are substantially spherical.

14. A powder batch as recited in Claim 10, wherein said particles comprise crystallites having an average size of at least about 20 nm.

15. A powder batch as recited in Claim 10, wherein said battery particles comprise no more than about 0.1 atomic percent impurities.

16. A powder batch as recited in Claim 10, wherein not greater than about 1 weight percent of said battery particles are in the form of hard agglomerates.

17. A thick-film paste composition suitable for screen printing onto a substrate, comprising:

- a) a binder phase;
- b) an organic vehicle phase; and
- c) a functional phase, said functional phase comprising fine battery particles, wherein said particles are substantially spherical and wherein said particles have a weight average particle size of from about 0.1  $\mu\text{m}$  to about 10  $\mu\text{m}$  and wherein said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

18. A thick-film paste composition as recited in Claim 17, wherein said particles have a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

19. A thick-film paste composition as recited in Claim 17, wherein said weight average particle size is from about 1  $\mu\text{m}$  to about 5  $\mu\text{m}$ .

20. A thick-film paste composition as recited in Claim 17, wherein said weight average particle size is not greater than about 3  $\mu\text{m}$ .

21. A thick-film paste composition as recited in Claim 17, wherein not greater than about 1 weight percent of said particles are in the form of hard agglomerates.

22. A battery comprising at least one electrocatalytic layer, wherein said electrocatalytic layer comprises fine battery particles having an average particle size of not greater than about 20  $\mu\text{m}$  and wherein said particles have a substantially spherical morphology and said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size .

23. An electrocatalytic device as recited in Claim 22, wherein said average particle size is at least about 0.3  $\mu\text{m}$ .

24. An electrocatalytic device as recited in Claim 22, wherein said average particle size is not greater than about 10  $\mu\text{m}$ .

25. An electrocatalytic device as recited in Claim 22, wherein said battery is a lithium-ion battery.

26. A method for the production of fine battery particles, comprising the steps of:

- a) forming a liquid comprising precursors to a battery compound;
- b) generating an aerosol of droplets from said liquid; and
- c) pyrolyzing said droplets to remove liquid therefrom and at least partially react said precursors to form intermediate precursor particles; and
- d) heating said intermediate precursor particles to form a powder batch of battery particles.

27. A method as recited in Claim 26, wherein said pyrolyzing step comprises passing said droplets through a heating zone having a reaction temperature of from about 500°C to about 1000°C in an oxygen-containing gas.

28. A method as recited in Claim 26, wherein said liquid is a solution comprising a lithium metal precursor.

29. A method as recited in Claim 26, wherein said liquid is a solution comprising lithium nitrate.

30. A method as recited in Claim 26, wherein said step of generating an aerosol comprises ultrasonically atomizing said liquid.

31. A method as recited in Claim 26, wherein said step of generating an aerosol comprises the use of a nozzle atomizer.